Cavity optomechanics with micro and nano-mirrors

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The development of very high finesse optical cavities together with low-mass micro-mechanical resonators opens the way to the study of optomechanical systems in which the dynamical properties are governed by the radiation pressure exerted by light on mirrors.

We have developed in collaboration with ONERA, the French Aerospatial agency, a novel quartz microresonator that combines excellent optical and mechanical properties. Placed in a dilution fridge environment, the resonator could reach the regime where its dynamic is dominated by quantum radiation pressure noise, demonstrating the quantum mechanical behavior of objects at an unprecedented scale of more than 25 μg. I will also present our latest developments towards the realization of optomechanical devices based on photonic crystal nanomembranes. These devices will be used as the basic building-block in the realization of a hybrid quantum system, coupling nanomechanical systems to cold atoms.